

Mount Diablo Astronomical Society

Diablo MoonWatch

June 2011

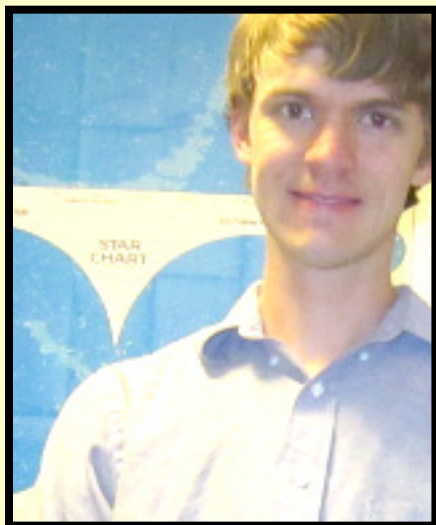
GENERAL MEETING

Tuesday June 28, 2011

GAMMA-RAY BURSTS: NATURE'S ULTIMATE WEAPON!

By Dr. Daniel Perley

*Doors open at 6:45 p.m.
Concord Police Association Facility
5060 Avila Road, Concord*



In the late 1960s, the US military launched into orbit a series of satellites designed to search for covert Soviet nuclear tests. None were ever found - but where the Russians left off, nature itself stepped in: the satellite network instead discovered intense flashes

of radiation coming from deep space.

These events, called gamma-ray bursts, are now understood to be highly focused beams of matter and energy, coming from dying stars at the edge of the known universe. Rare but unfathomably powerful, these sudden stellar detonations are the biggest explosions in the universe since the Big Bang itself. Along with dozens of other scientists across the planet, I am part of an instant-response team that springs into action each time an orbiting satellite detects a new gamma-ray burst.

Not to save the world (the danger to Earth from gamma-ray bursts is very small), but to scramble to gather whatever observations we can before the explosion fades away. In my talk, I will describe life as a front lines gamma-ray burst researcher, trace the development and history of the field through the present, and discuss some of the most cutting-edge current results.

Please join us Tuesday June 28 to listen to Dr. Daniel Perley

Daniel is a researcher at the University of California, Berkeley, where he recently completed his Ph.D. studies on the environments of gamma-ray bursts. His other interests include unusual supernovae, the very high-redshift universe, and the properties of cosmic dust in distant galaxies - not to mention hiking, skiing, travel and adventure. He will begin his postdoctoral work as a Hubble Fellow at Caltech at the end of the summer.

WHAT'S UP

by Marni Berendsen

The Universe in Your Pocket

When we observe with the public, we all get questions like these:

- "What are you looking at?"
- "Why doesn't it look like the pictures?"
- "What power is your telescope?"

Discover easy and engaging ways to answer visitors' questions that you can keep in your pocket.

Yosemite Star Party June 24th and 25th, 2011



PRESIDENT'S CORNER

Casual Astrophotography

by Chris Ford

This month I am going to take advantage of my Presidents corner for a little evangelism on the joys of taking casual images of astronomical subjects. "Casual" in this context means taking astronomically themed pictures with no complex setup, no lengthy learning curve, and no extra expense. You don't even need a telescope. All you need is the camera you probably already own and a firm mounting or tri-

pod pictures of the evening as well as your normal telescopic viewing activities. The entire sky, the horizon, your observing site and fellow astronomers, all of them are excellent subjects. (Just make sure your flash is turned off!) All you need to do is to master a few simple tricks of low light photography.

The key advantage of the modern digital camera for any low light night

photography is the ability to take pictures at different exposure lengths, judge the results through the "live" view of the resulting images on the back of your camera, and keep or dispose of them according to your taste and choice. In fact, the

immediate feedback of a "live" view on the back of your camera is in my opinion the single most important advance in astrophotography since the change from film to digital. Now focussing and testing exposures through trial and error is immediate, easy, and accessible to everyone. Astrophotography can be genuinely casual.

So what kind of camera do you need?

In many cases the standard

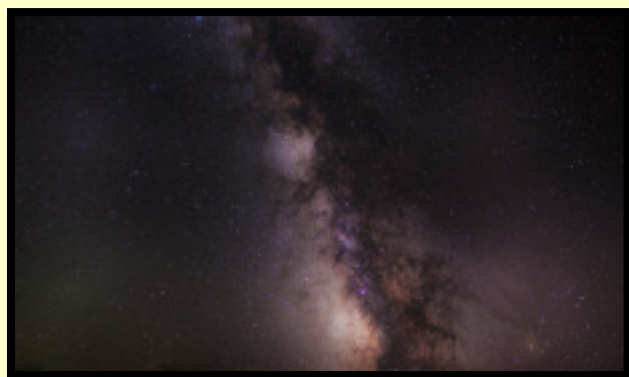
Digital Still camera (DSC) costing just a few hundred dollars that



Stars trailing around Polaris over my back yard (2011)

you already use for family or other terrestrial photography is capable of taking wide angle astronomical vistas of the deep sky. Your camera only needs to be able to do two things. First, you need to check that the camera is capable of a timed exposure. Depending on the brand, many can take exposures up to 30 seconds long or more. All DSLR (Digital Single Lens Reflex) cameras have a "B" (or Bulb) option allowing you to take exposures of any duration and are especially suitable. These cameras generate ever lower levels of noise in dim light conditions and are very usable for casual astrophotography. Secondly you need to make sure you can keep the camera absolutely still for the duration of the exposure. A camera tripod is ideal but a wall or other firm surface can work equally well. This leads to a consideration of what kind of astrophotography your camera is most suitable for.

The simplest scenic astropho-



Milky way at the Oregon Star Party 2009

pod to put it on. Even though you can certainly delve deeper into prime focus, piggyback, and guided astrophotography using equatorial mounts, this is not the focus of this article. "Casual" astrophotography on a whim is definitely the name of this game.

Visual observation

Even if you are a visual only astronomer, taking your camera along on an observing night provides the opportunity to take ran-

Casual Astrophotography *(Continued from previous page)*



A hand held afocal image of the Moon.

tography is to simply set your camera on a tripod, wall, or other firm surface, point it at the horizon on a clear night, and take a picture with the longest exposure possible with the lens focused on infinity. Take a look at what you get. The odds are that you will see a lot of stars against the horizon. If the milky way is in your field of view and the sky is dark the results can be spectacular. If your image is washed out or brownish is color, it is probably light pollution so just reduce the exposure length and try again. It is as simple as using trial and error to get started. Another test is to simply point your camera at a well known constellation. You cannot go wrong with Cassiopea or the Big Dipper. It can be quite a thrill to see a well known constellation standing out in your image. I find there is a distinct satisfaction in shooting these wide angle vistas. Yes, you have seen them hundreds of times before in magazines and books, but these are *your* images. Above is a timed DSLR exposure taken in the very deep

skies at the Oregon Star Party. (OSP)

Another simple type of astrophotography is to photograph some star trails.

You have no doubt seen these images as in the example above that I recently took from my backyard above. These images are far more meaningful though when you take them above

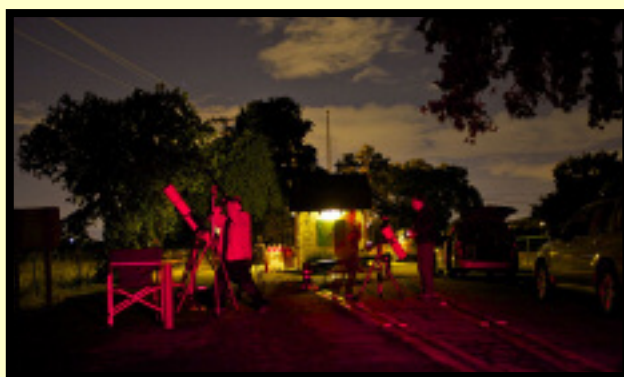
“your” home. It gives you a very real sense of your place in the Universe and how it revolves around you! Just look for Polaris, position your camera so that your house is underneath and expose an image for as long as you can. The length of the star trail depends on how long the shutter is open. To get reasonably long trails you will need to expose for 10 minutes or more, though in light polluted skies the longer you expose the more chance you have of washing out your picture. This is where having the ability to control the aperture (f/stop) of your camera and ISO is helpful so experiment. These features are found on all DSLR's and on some DSC's. If you want really long star trails you can shoot multiple long exposures one after the other, and combine them together in a simple software application called StarTrails. (Google it) Again this is a very

simple process and you do not even need a telescope.

The Moon is another obvious target

Through a standard camera it will usually appear quite small in your picture. The key as with star trails is to have something in the foreground to make it a more interesting picture. Unlike the deep sky, the Moon is extremely bright so exposures timed at hundredths of a second in duration are necessary. Again experiment using the live display on the back of the camera to check your results. Be casual.

To take close up images of the Moon a telephoto lens is needed but these lens are quite expensive for the amount of focal length that you will need. In fact you can take quite satisfactory pictures of the Moon by simply placing your camera next to the eyepiece of your telescope when it is pointed



MDAS Society Night, May 29th at the North Gate (2011)

at the Moon. No special mount is needed, and it can be any telescope as the Moon is so bright that your exposures will be almost instant. You can use the "live" image on the back of your camera to achieve the right fram-

Casual Astrophotography *(Continued from previous page)*

ing and focus then take your picture. This is a type of astrophotography called afocal astrophotography, and though you have to keep your camera as still and central as possible you can get some fairly impressive results. In fact there are even simple mounting brackets you can use to attach a camera to the eyepiece of your telescope.

You don't even have to take pictures of the Moon or the deep sky. Taking pictures of your fellow astronomers at a star party observing site can be a lot of fun and a memento of the occasion. Again, just remember to turn off the flash! Here is a picture I took on our recent Society Night on

Saturday May 29th 2011. The weather was so bad at the summit of Mount Diablo that we all went down to the base of the mountain to find a clear spot. Eventually we set up right at the North Gate entrance to the park next to the ranger station. Here we all are, where I used a Canon 40D with a 20mm lens and "painted" my fellow astronomers by scanning a red flashlight across the scene with a timed exposure lasting just 10 seconds.

With the one-shot color DSC and DSLR cameras, you can take images that rival those taken just a few years ago by seasoned professionals. Next time you head out

observing, take along your camera and be casual!

For more information

If anyone would like to learn more about astrophotography in all its forms, you may be interested to know that the MDAS has an imaging group that meets regularly on the second Tuesday evening of each month in Walnut Creek. Just email me at cford81@comcast.net and I will be happy to provide you with more information.

Chris Ford

Public Lecture on Astronomy

Wednesday, June 29, 1 - 2 p.m.

Lawrence Hall of Science, University of California, Berkeley

"Where Bill Gates' Great-Granddaughter Might Go on Her Honeymoon: The Top Tourist Sights of the Solar System"

An illustrated nontechnical talk by astronomer Andrew Fraknoi

Astronomer and popular lecturer Andrew Fraknoi will explore the most intriguing future tourist destinations among the planets and moons in our cosmic neighborhood, including the 4,000 mile lava channel on Venus, the towering Mount Olympus volcano on Mars (three times the height of Mount Everest), and the awesome Verona Cliffs on the moon Miranda (which are the tallest "lover's leap" in the solar system). The talk will be illustrated with close-up images from the robot probes that are exploring these alien worlds.

Fraknoi is the Chair of the Astronomy Department at Foothill College and the former Executive Director of the Astronomical Society of the Pacific. He was selected as the 2007 California

Professor of the Year and is the winner of the Gemant Prize of the American Institute of Physics for bringing science to the public. He appears regularly on several Bay Area radio stations, explaining astronomical developments in everyday language. The International Astronomical Union has named Asteroid 4859 Asteroid Fraknoi in recognition of his work in science education.

No advanced tickets; the lecture is free, but you must pay regular admission to the Lawrence Hall of Science. Buy admission tickets by calling 510-642-5132.

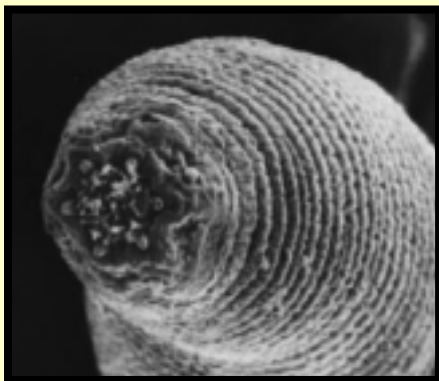
Tickets: \$12 Adults (ages 19-61), \$9 Students/seniors/disabled (ages 7-18 or 62+), Free for members.

What Would an Alien Look Like?

by Nathaniel Bates

This is breaking news.

As of this writing, a worm has just been discovered that can live a kilometer underground. In particular, this worm has tremendous implications for the possibility of extraterrestrial life in environments very much unlike Earth.



Halicephalobus mephisto

Notice the essentially “alien” look of this worm, even if in many ways the structure of the worm is not fundamentally different than Nematodes on the surface of the Earth. In a sense, we have discovered an “alien” life form because, while bacteria have been known to exist well underground, scientists did not expect to discover multicellular life so deep under the Earth. Looking at the figure in front of me, I cannot help but to feel a profound respect for the seeming impulse of life to push the boundaries of what seems possible. The Universe may well be more alive than we have ever suspected.

The possibility of alien life begs the question of how such a being might look to us.

Would they look profoundly different than us? It is tempting to look at this worm and suspect that

aliens must look like some kind of invertebrate or an even more foreign type of life form because such life forms would be better adapted to the environments of foreign planets. Indeed, according to the thinking of a great many scientists, life can take any number of diverse shapes unlike what we might conceive of on Earth. For an alien to resemble an Earth life form would be impossible because it is, well, alien. This is the current thinking, but we have to be humble in the face of facts and even more humble when we do not have the facts. The truth is that we do not know. The only thing we have to go on are speculative models, and it is those that I will address in this article.

Speculation on alien life goes back at least a few centuries. Most serious speculations on alien life posited that the extraterrestrials we encounter would exist on neighboring planets. The environments of such planets were not well understood in the eighteenth century, and it was generally assumed that these planets were similar to Earth. Speculations about alien life assumed that these worlds had essentially earthlike environments. Often these beings were seen as more likely than not human. Venus was imagined to have plants even as late as the twentieth century, while Mars was imagined to have canals. Any life forms on those worlds were naturally assumed to be adapted to worlds like Earth, thus earthlike. Late twentieth century planetary voyages showing worlds fundamentally unlike Earth have dampened hopes that we would find

life on those worlds, though some still hold out hope. Now the hopes of Astrobiologists hinge on worlds well outside of the Solar System. Such worlds are not necessarily like Earth, giving rise to the possibility of extraterrestrials unlike anything we might conceive of.

Again, we do not know.

We have only working models. Eighteenth century man inherited a philosophy from the Middle Ages called the Chain of Being. This philosophy held man to be at the top of the natural order, with animals below him, plants below them, and rocks at the very bottom. The human form was seen as created in the Divine Image. Thus, the human form became the standard by which Nature was judged, and by extension our bodies were the model for any potential intelligent life on another world. This idea was challenged by Darwinian notions of evolution, claiming as they did a world in which organisms were randomly adapted to their environments. If organisms are adapted to their environments, then each organism is adapted to its ecological niche and thus none can really be seen as “above” any other. I would argue that the Chain of Being view was a misunderstanding of the Hebrew concept of the “Divine Image” found in the Bible (which has nothing to do with physical image). Indeed, evolutionary biologists often have religious sentiments and are not uniformly atheist by any means. However, what cannot be disputed is that Darwinian biology dethroned the idea of a Chain of Being.

What Would an Alien Look Like? (Continued from the previous page)

This change did not occur all at once

However, Early Darwinian thought retained some aspects of the "Chain of Being" idea in the form of Social Darwinism. The Social Darwinists tried to hold on to a hierarchical view of biological life, with some species superior to others and some humans were superior to others humans. The Social Darwinist idea dominated biology for almost a century after Darwin. The concept of superior races and superior species brought forth the idea of eugenics. Biologists soon rebelled against these notions, though not soon enough sadly. Late twentieth century evolutionary thought discarded the whole idea of "superior" and "inferior" life forms. Paleontologist Stephen Jay Gould helped to overturn many of the older Social Darwinist notions that were impeding science and bogging it down with antiquated social notions. Life ceased to be a hierarchy and became a mosaic. It was at that point, interestingly enough, that biologists began to speculate on what form aliens might take. Astrobiology got off the ground right about the time that the Chain of Being was finally discarded and we assumed that an alien might resemble any number of possible forms.

A consequence of the modern form of Darwinian biology

Nature does not have one template of what a "superior" life form must be. Humans may well be just one of many forms an intelligent life form might take. Today's

Astrobiologists have to take in to account the possibility that an advanced life form might be adapted to a planet of extremely strong gravity, extremely light gravity, thick atmosphere, thin atmosphere, or even a double star system with all of the tidal forces that might come of such an arrangement. Each of those planets might give birth to entirely unique forms of advanced intelligent life. We might speculate that the hominid form has structural uses, and might be best adapted to an intelligent tool making life form. Yet, we cannot know absolutely that this is the course that Nature would follow. Such open ended speculation, coupled with a lack of willingness to ascribe one unique form to an advanced intelligent life form, has become the dominant paradigm for Astrobiologists in the modern age.

Intriguingly enough

Stephen Jay Gould, who had done so much to overturn some of the darker ideas within early Darwinian thought, also pushed a revolutionary notion in biology. Gould is famous for the notion of Punctuated Equilibrium, a challenge to orthodox Darwinian gradualism. However, Gould also put forward the idea that the development of life has a great deal to do with structural changes building upon earlier structural changes. He did not view the development of life as purely an act of adaptation. Thus, even seemingly similar adaptive pressures could give birth to entirely different results. Gould's influence on biology allowed for a degree of randomness that, if

extended to other planets, might lead us to suspect that we cannot even guess what an alien would look like. As much as I respect Gould, in particular for his assaults on Social Darwinism, many aspects of his argument are difficult for me to swallow. I think that by knowing a planet's environment we might be able to speculate with some knowledge.

Perhaps it is possible to know something about intelligent tool users on a planet by knowing its gravitation and atmosphere. For one thing, the higher the force of gravitation, the flatter an organism might have to be just to alleviate the pressure of gravity. Bipedalism might be less likely under those circumstances. Such conditions might limit tool making abilities. The thicker the atmosphere, the more an organism would have to adapt to atmospheric pressures. Conversely, thinner atmospheres and less gravity might encourage tool making abilities, although such creatures might have to adapt to higher levels of radiation. Finally, a hot star might mean less water, or more water vapor, affecting life. I am clearly no Astrobiologist, but we could imagine some conditions under which tool making would succeed as an adaptation. I tend to believe that some form of erect posture would be best for tool making. And, I tend to think that bipedalism is a good adaptation. This does not mean that all intelligent aliens would be bipedal. I imagine, however, that we are not the only creatures in the Universe that are bipedal. It may even be that bipedal creatures could engineer

What Would an Alien Look Like? (Continued from the previous page)

other bipedal creatures through genetic engineering if they so desired, particularly if they felt a need to replicate intelligent life like themselves.

Again, I do not believe that intelligent tool making life is restricted to the bipedal form. One can intelligently speculate about tool making land octopi, fungal philosophers, or photosynthesizing poets. Of course, these would not be octopi, fungi, or plants. They would resemble those creatures, but be of an entirely different lineage. Biologists call this "convergence," where two species of unlike origins resemble one another due to similar adaptive pressures. Indeed, I cannot limit what an alien might look like because I suspect that the Universe is brimming with biological creativity. Again, returning to the worm found under the Earth, I personally feel that life has an intrinsic principle that it wants to expand and adapt to as many different environments as it conceivably can. I tend to believe that intelligence is a method by which life adapts itself to as many different environments as possible. I cannot dismiss the possibility that intelligence is intrinsic to life itself, a non-mechanistic principle that Neo-Darwinists might find dubious but which seems to be borne out in the way that life radiated from the oceans to land, and filled even the most extreme environments. Perhaps the movement in to space follows a similar intrinsic principle of life that can-

not be fully quantified but which seems borne out in the long eons of natural history. If my suspicions are correct, it is one more reason to believe in a Universe filled with life. Life propagates life, seemingly with a will of its own.

There is one more intriguing notion out there that should be noted for the record.

Paleontologist Simon Conway Morris has made waves by suggesting that the human form is probably the supreme form that a successful intelligent tool making organism would take. His ideas are something of a return to the earlier model of how the human form was thought to be supreme, and I am skeptical. However, I admit that he does have some pragmatic structural and engineering arguments that could be considered. Dale Russell built on the idea that the hominid form is universal to any successful tool maker when

would be bipedal:

This speculative Dinosauroid became world famous. It might have inspired the famous bipedal dinosaur creatures of "Land of the Lost." Russell's idea of intelligent dinosaurs being naturally bipedal is intriguing, one that would suggest that aliens would also be bipedal if they were to be successful tool makers. Indeed, the idea that the humanoid form could be relatively common has received support in some corners.

Personally, as much as I support the belief that life has certain intrinsic impulses, I tend to be skeptical of the idea that life has some fixed endpoint. I think that if the humanoid form is common, it still is not exclusive. The Universe is too diverse for one form to dominate. I have a romantic attachment to the walking octopi, the artistic snail, or the flying fish, all of them with no actual relationship to Earth organisms of course. But, all I have is speculation. Alas, however, speculation is done for. We do not need guesses. We need evidence. With SETI offline and NASA budgets cut, the ability to gather evidence is slipping precisely when the data from extra solar planets is so intriguing. If life does have an intrinsic drive to explore and overcome obstacles, then we had better

manifest that trait if we want the search for truth to continue freely as it has for the last few centuries.



Credit : Canadian Museum of Nature, Ottawa, Canada

dinosauroiddawkinsahj

he imagined an alternate scenario in which dinosaurs survived the Cretaceous extinction and evolved intelligence. He assumed that such intelligent tool making creatures

Mount Diablo Astronomical Society Event Calendar—June 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	31	1	2	3	4 8:00 PM Astronomy: SPACE ROCKS! (CANCELLED) Sunset: 8:28 PM
5	6	7 9:00 PM Walnut Acres Star Party	8	9	10	11 Sunset: 8:32 PM
12	13 Board Meeting (Private)	14	15	16	17	18 Observatory Maintenance (Private) Sunset: 8:34 PM
19	20	21	22	23	24 Yosemite Weekend (Private)	25 Yosemite Weekend (Private) Society Observing (Private) Sunset: 8:36 PM
26	27	28 7:15 PM GenMtg: Gamma Ray Bursts	29 Golden State Starparty	30 Golden State Starparty	1	2



Yosemite Star Party June 24th and 25th, 2011

Yosemite Stargazing weekend at Glacier Point June 24-25. Glacier Point road is now open. We may be staying at the Glacier Point Ranger Housing area. There are a few tables, and a bath, however this is not a normal campground. It is a short walk to Glacier Point. If Bridal veil Campground opens in time, we could be camping there instead. If you are interested in attending please email Jim Head at outreachinfo@mdas.net.

Board Members & Address

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MDAS

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General Meetings:

Fourth Tuesday every month,
except on the third Tuesday

Refreshments and conversations
Meetings begin at 7:15pm.

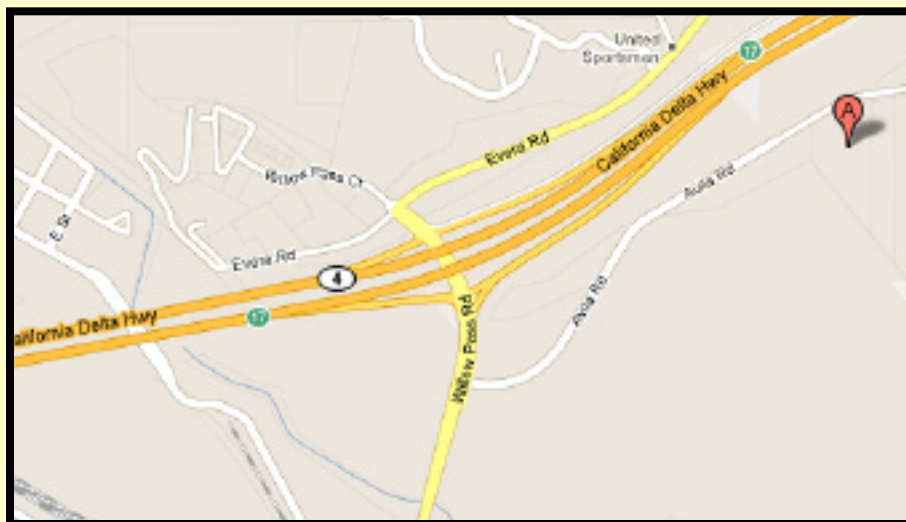
Where:

Concord Police Association

5060 Avila Road, top of the

Take Avila Road from Willow

Directions to facility:



The Golden State Star Party 2011

June 29 to July 3, 2011

The Golden State Star Party is a 4 night dark sky event held each summer at Frosty Acres Ranch in North-Eastern California, near Mount Lassen, alongside rural Adin, California. GSSP has dark skies from horizon to horizon, and room for 100s of astronomers. There are 95 spots left. See <http://www.goldenstatestarparty.org/> for registration and additional information.